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ABSTRACT

This study is intended to assist state vocational education agencies that have made or will make the decision to increase their responsiveness to the skill training needs of their state's defense industrial base. Background is provided on the defense industrial base, the extent of the projected expenditures for defense and for the procurement portion of the defense budget, and the expected employment effects of these expenditures. Five strategies accompanied by 30 suggested procedures for their implementation are presented for consideration by states as they initiate or increase their training response to the skill needs of firms within the defensive industrial base. They are (1) to develop awareness and commitment, (2) to develop needed collaborative arrangements, (3) to plan to respond, (4) to implement a response, and (5) to continue to strengthen vocational education's ability to respond. These findings are reported: (1) few state vocational education agencies give priority to skill needs of firms doing defense work; (2) employment information to convince agency staff to prepare workers is lacking; (3) state vocational education agencies need to be able to identify firms doing defense work; and (4) the Congress and Departments of Defense and Education believe the defensive industrial base is ailing. Recommendations are made for the federal and state levels. (YLB)

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**RESPONDING TO DEFENSE INDUSTRIAL BASE
TRAINING NEEDS**

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1984

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FOREWORD

Testimony has been presented before members of Congress that defense-related production is being adversely affected by spot shortages of skilled industrial workers and by the presence of incumbent skilled workers who need new skills or need to upgrade existing ones. This report examines the basis for this concern and suggests ways that state vocational education agencies can respond to this employment skills problem. It also offers recommendations for ways that federal and state entities may assist state vocational education agencies to make the most effective responses.

The National Center is indebted to Harold Starr, who served as the project director and produced the report. He is a Senior Research Specialist in the Evaluation and Policy Division of the National Center.

Special appreciation is extended to the many persons in the states who reacted and contributed to sections of the report during its development and to Charles Dale, Economist, U.S. Army Research Institute, Alexandria, Virginia; Paul Pothin Industrial Relations Advisor, U.S. Air Force, Washington, DC; Henry David, Consultant, Washington, DC; Richard Dempsey, the National Occupational Information Coordinating Committee, Washington, DC; Arthur Lee, Senior Research Specialist; Alan Wiant, Research Specialist; N.L. McCaslin, Associate Director of the Evaluation and Policy Division; and Steven Gyuro, Associate Director, Program Management at the National Center for their expert reviews of this report.

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in Vocational Education

EXECUTIVE SUMMARY

Testimony has been presented before members of Congress by industry representatives that indicates serious production problems exist within the domestic defense industrial base. It has been suggested that as a result of these production problems national defense preparedness goals become difficult to achieve in a timely manner and firms within the base face stiff competition from foreign firms in securing defense contracts and subcontracts.

This testimony before members of Congress suggests that there are two skills-related problems that contribute to production problems within the domestic defense industrial base. There are skilled workers that need to acquire new skills or upgrade their existing ones and spot shortages of skilled industrial workers have been observed.

Congress and the public-at-large view vocational education as an important instrument for providing skilled workers for the American work force and for retraining and upgrading the skills of incumbent workers. It therefore seems reasonable that Congress and the public should expect vocational education to produce the kinds, numbers, and quality of skilled workers needed to meet national defense production goals and improve the competitive posture of the defense industrial base.

This study will assist those state vocational education agencies that have made or will make the decision to increase their responsiveness to the skills training needs of their state's defense industrial base, in the event a need to do so exists or arises. The study does so in three ways:

- By sensitizing state vocational education agencies to the federal concern that the defense industrial base is ailing, partly because of the need to upgrade the skills of many incumbent skilled workers, and partly because of the existence of spot shortages of skilled workers
- By suggesting five strategies and thirty procedures for their implementation that state vocational education agencies can use to initiate or increase a response to the skill needs of the state's defense industrial base
- By recommending ways that federal and state entities could assist state vocational education agencies in this endeavor

Major findings and recommendations that resulted from this study are presented next.

Findings

- Only a few state vocational education agencies participating in the present study give a special priority to promoting or supporting either customized training programs or regular institutional programs *specifically* to meet the skill needs of firms doing defense work.

Most state vocational education agencies participating in the study feel no sense of urgency that would otherwise impel them to respond more vigorously.

- There is an absence of employment information of the kind that is needed to convince key staff in state vocational education agencies that there is really an urgent need with regard to preparing or upgrading skilled workers for their state's defense industrial base. The availability of such employment information does not ensure a greater response from state vocational education agencies, but it is probably a necessary precondition.
- State vocational education agencies need to be able to identify the firms in their states that are doing defense work. Only a few state vocational education agencies participating in this study have information about the size or diversity of their state's defense industrial base or have access to the names of the firms comprising the base. Key staff in most state vocational education agencies have no idea how to get such information.
- The Congress and the U.S. Departments of Defense and Education believe that the defense industrial base is ailing. This belief is partly based on employers' claims of both spot shortages of skilled workers and the presence of too many undertrained skilled workers within the base. The Congress and the Departments believe that the public vocational education systems and firms within the defense industrial base should be closely collaborating in order to ensure that needed skills training is available where and when it is needed. Unfortunately, such collaboration for skill training purposes is not yet in place on a large scale and the major reasons for this situation remain unclear.

Recommendations

Congress should consider the following actions:

- Incorporate in legislation the federal concern that vocational education systems serve the skill needs of the nation's defense industrial base. Federal legislation can express this concern in several ways. For example, the concern could be incorporated within the statement of purposes for such legislation. Alternatively, the legislation could explicitly make provisions for states to use federal dollars to plan for, administer, and/or support vocational education to meet defense industrial base skill needs.*
- Pass a technical amendment to the Job Training Partnership Act of 1982 to the effect that, where appropriate, Private Industrial Councils (PICs) include a representative of local firms doing defense work.
- Continue to encourage the U.S. Departments of Labor and Defense to report on skill needs within the defense industrial base nationally, regionally, and by state.
- Suggest to the federal administration that the membership of the National Advisory Council on Vocational Education include someone who can represent the interests of the defense industrial base.

*Funding for exemplary programs and setaside provisions are two kinds of federal mechanisms that can stimulate a state response to the federal concern. Setaside provisions were not viewed as desirable by some of the vocational educators participating in this study because of what they viewed as inflexibility in allocating vocational education monies in response to needs. However, this mechanism is more likely to produce a state response to the training needs.

The U.S. Departments of Education and Defense should consider the following actions:

- Recommend to the states that a military procurement representative sit in as a member of a technical group to advise the state plan group.
- Let each state vocational education agency know which person(s) in the U.S. Departments of Defense and Education will serve as contacts to respond to inquiries from state vocational education agencies regarding firms doing defense work (e.g., who they are and where they are) and to identify persons who could be helpful in assisting these state agencies in organizing statewide vocational education efforts in response to defense industrial base skill needs.
- Create increased awareness among the vocational and industrial communities about the federal concern for the skill needs of the defense industrial base via such means as publishing and disseminating a newsletter that highlights skill needs within the base as well as exemplary vocational education and industry collaborative efforts to deal with those skill needs.

State legislatures should consider the following action:

- Provide sufficient funds to support local- and/or state-agency sponsored customized vocational education programs to meet the state's defense industrial base skills training needs.

Governors should consider the following action:

- Implement regional invitational meetings for state board and agency leaders and representatives from a cross section of firms doing defense work to (1) create an arena for formal dialogues between vocational education and industry persons, and (2) encourage the parties to develop a joint plan for implementing a vocational education response to defense industrial base skill training needs.

Local school boards and vocational education administrators should consider the following actions:

- Invite state vocational education agency administrators to meet with the administrators of local education agencies and postsecondary education institutions within the area and with chief executive officers of firms doing defense work in the area served by these districts and institutions to (1) examine the conditions, incentives, and benefits that are required for school-industry collaboration for training workers; and, (2) to get clarification about the level and kinds of support that are available from the state vocational education agency.
- Request technical assistance from the state vocational education agency to establish a local level brokering service that can match the training needs of firms doing defense work in the local labor market area with local education agencies and postsecondary institutions serving the labor market area.

CHAPTER I

INTRODUCTION

Testimony has been presented before members of Congress by industry representatives that indicates serious production problems exist within the domestic defense industrial base. It has been suggested that as a result of these production problems national defense preparedness goals become difficult to achieve in a timely manner and firms within the base face stiff competition from foreign firms in securing defense contracts and subcontracts (U.S. Congress 1981; U.S. House 1980, 1982; McKinney 1983).

This testimony before Congress also suggests that the ability of the nation to achieve its defense preparedness goals depends on at least two conditions being met. First, defense industrial base firms must become more productive and competitive by modernizing their plants and installing new technologies. Second, training programs must be implemented or expanded to provide the defense industrial base with the quality and number of skilled workers it requires, where and when skilled workers are needed, both immediately and in the future.

Given the increased difficulties the domestic defense industrial base has been having in maintaining a cost-competitive edge on foreign manufacturers (U.S. House 1980), it is not reasonable to expect that this industrial base can provide for the costs of providing needed skills training programs without further damaging its competitive posture. Likewise, it is not realistic to expect a large number of these firms to be solely responsible for implementing training programs when their needs for skilled labor are unpredictable over time, and are contingent upon the potential of defense contracting and subcontracting.

Thus, an important responsibility for training programs to meet the skilled labor requirements of the defense industrial base will, of necessity, fall to public and private training agencies and institutions. One major delivery system that will surely be called upon to provide much of this training is the public vocational education system, especially through its postsecondary institutions (e.g., area vocational education schools, community colleges, and technical institutes). Postsecondary vocational education already has the structure and capability to provide training for the full range of skilled occupations requiring less than a baccalaureate degree.

Responsiveness to Date

Since the mid-1970s, there has been a rapid escalation of efforts by state vocational education systems to collaborate with local vocational education agencies and institutions to implement customized skill training programs for industry and for civilian workers employed by the U.S. Department of Defense (DOD) (Bottoms 1982; Brant 1982; Burdette 1982; Duvall 1983; Tuttle and Walls 1979; U.S. Departments, 1983; *VocEd* 1983).

There are examples of effective customized training programs being offered by vocational education to firms doing defense work (U.S. Departments 1983). However, inquiries made as part of the present study suggest that many state vocational education agencies have not knowingly made a substantial investment in serving firms that do defense work. Most of the state vocational education agencies participating in the study were aware of the federal interest in having vocational education work with firms doing defense work. However, most of these agencies continue to have little or no indication that firms in their state doing defense work have serious skills training needs.

In response to the federal concern that the defense industrial base is experiencing skills problems, the U.S. Departments of Education and Defense are promoting more extensive and closer working relationships between vocational education and firms doing defense work. For example, the U.S. Department of Education, Office of Vocational and Adult Education, has established a Defense Preparedness Task Force. Among its other activities, this task force convened an ad hoc Defense Preparedness Review Group representing industry, public and private postsecondary institutions, state education agencies, trade associations, and training specialists (U.S. Department of Education 1982). This group recommended actions to facilitate the implementation of a national strategy that would ensure a continuing supply of high quality skilled workers for the nation's defense industrial base.

Another activity of the U.S. Department of Education was to join with the U.S. Department of Defense (and in cooperation with the American Vocational Association) to plan for and conduct the Vocational Education and Defense Preparedness Seminar (U.S. Departments 1983; *VocEd* 1983). This seminar gathered together vocational educators, defense industrial base representatives, and military personnel from across the country. Participants learned about the employment effects of defense spending and about the need for closer collaboration among the defense establishment, the defense industrial base, and vocational education. Participants at the seminar were also informed of different arrangements by which successful collaboration is already taking place in a number of states.

The skills problem that Congress believes is being experienced by the nation's defense industrial base represents one skills problem of national significance for which vocational education is appropriate. Other skills problems of national importance for which vocational education is appropriate include, retraining permanently displaced workers for other kinds of employment and updating the skills of incumbent workers to help them adapt to rapidly changing and emerging technologies and methods of production. By building a capacity to respond to the complexities involved in meeting defense industrial base training requirements, state vocational education agencies will develop the planning, operations, and staff capacity to respond to other current and future national skills problems.*

Focus of the Study

The states are not responsible for national security, yet they do have an interest in the procurement of defense goods by the federal government. Federal contracts and subcontracts mean revenues and jobs in the states that receive them. A state's vocational education system bolsters a state's ability to attract defense work by making sure that skilled and productive workers will be

*One example is the federal interest in having public vocational education provide training programs for components of the defense establishment other than the defense industrial base. These other components include the active military, the reserves, and national guard, and civilian workers at facilities and bases operated by the military.

available, when and where they are needed. It can do this by providing customized training services to industry and by establishing ongoing regular programs to prepare a pool of skilled industrial workers in anticipation of industry needs.

Large firms doing defense work often provide in-house training, but in many instances they must contract for the training needed to upgrade the skills of their existing work force. Small- and medium-size firms doing defense work often do not have the staff or money to do their own training or to contract for such services.

Congress and the public-at-large view vocational education as an important instrument for providing skilled workers for the American work force and for retraining and upgrading the skills of incumbent workers. It therefore seems reasonable that Congress and the public should expect vocational education to produce the kinds, numbers, and quality of skilled workers needed to meet national defense preparedness goals and improve the competitive posture of the nation's defense industrial base.

Public vocational education does have the structure to deal with occupational skills shortages and training needs of firms doing defense work, and state vocational education can take the lead to do so. However, planning strategies and implementing procedures are not yet in place in many states that would enable a state's vocational education agency to respond specifically and efficiently to the skill needs of firms doing defense work.

Some state vocational education systems have actively initiated efforts to provide for such skill needs. But a review of state plans and annual program plans for vocational education indicates that most states do not give a visible priority to dealing with this national concern.

This study will assist those state vocational education agencies that have made or will make the decision to increase their responsiveness to the skills training needs of their state's defense industrial base, in the event a need to do so exists or arises. The study does so in three ways:

- By sensitizing state vocational education agencies to the federal concern that the defense industrial base is ailing, partly because of the need to upgrade the skills of many incumbent skilled workers, and partly because of the existence of spot shortages of skilled workers
- By suggesting strategies and procedures that state vocational education agencies can use to initiate or increase a response to the skill needs of the state's defense industrial base
- By recommending ways that federal and state entities could assist state vocational education agencies in this endeavor

Background

This section of the report describes the defense industrial base, the extent of projected expenditures for defense and for the procurement portion of the defense budget, and the expected employment effects of these expenditures.

The Defense Industrial Base

The U.S. Department of Defense (DOD) procures goods and services by contracting with this country's defense industrial base. A precise definition of the domestic defense industrial base does not exist. In general terms, the domestic defense industrial base can be defined as:

... encompassing those elements of American industry that contribute to defense-related work and whose production capacity and technical expertise are required to meet national security requirements. (U.S. House 1980, p. 5)

More specifically, the domestic defense industrial base is comprised at any one time of about twenty-five to thirty thousand prime contractors, about fifty thousand small- and medium-size firms that function as subcontractors, and an unknown number of vendors and their suppliers who provide components to the contractors and subcontractors. Most of these firms are engaged in civilian as well as defense-related work (ibid.). There can be as many as four or more tiers of subcontractors involved in large DOD procurements.

The size and identity of the firms comprising the domestic defense industrial base are continuously changing. Some industry persons believe that the size of the defense industrial base may even be shrinking. The slack is being taken up by foreign firms that meet the quantity and quality specifications required for defense work, and do so more cheaply than domestic firms (ibid.). The defense industrial base is considered to be a highly competitive one that has been described as being in a continuing state of turbulence (U.S. Congress 1981; U.S. House 1980).

Congress believes that the domestic defense industrial base is ailing for many reasons. A few of the reasons are as follows:

The industrial base is not capable of surging production rates in a timely fashion to meet the increased demands that could be brought on by a national emergency; skilled manpower shortages exist now and are projected to continue through the decade;

Productivity growth rates for the manufacturing sector of the U.S. economy are the lowest among all free world industrialized nations; the productivity growth rate of the defense sector is lower than the overall manufacturing sector. . . . (U.S. House 1980, p. 11)

In response to a growing belief that the domestic defense industrial base is ailing, two pieces of legislation were introduced in the Congress in 1982. These were S. 2038 (which would in part have required certain defense contractors to provide training in skilled occupations in which there are substantial shortages) and H.R. 5540, the Defense Industrial Base Revitalization Act (which would have placed a heavy emphasis on skill training by vocational education). Neither piece of legislation was passed. The Defense Industrial Base Revitalization Act was resubmitted for consideration by the House of Representatives as H.R. 2057 in early 1983. Action has yet to be taken on this resubmission.

McKinney (1983), in seeking to promote the need for the Defense Industrial Revitalization Act, has summarized findings of the Economic Stabilization Subcommittee of the House Banking Committee on the ailing defense industrial base. According to the Subcommittee:

What we found was . . . a declining number of firms, a growing shortage of skilled personnel, obsolete equipment, little investment in research, and the resulting difficulties in meeting national defense. . . .

Too many people fail to make the connection between the first four items and the vital fifth. . . .

Probably most symptomatic, the "lead time" (the time it takes to fill an order) for many defense items has doubled and tripled since 1978. (Ibid., p. 6)

Expenditures for DOD Procurements

The DOD estimates that defense expenditures will total more than 1.6 trillion dollars (based on the 1982 value of the dollar) for the period FY 1982 through FY 1987 (Dale 1983). A substantial portion of this money is expected to be used to buy durable goods for the military (Dale 1983; Personick 1981). The portion of the DOD budget going to buy durable goods was expected to be 23.4 percent in 1982 and to rise to 32.9 percent by 1987 (Brown and Doggett 1981).

A number of studies and reports show that future defense spending will significantly increase the needs for skilled workers by the defense industrial base. Some of these studies and reports are described next.

Employment Effects of National Defense Expenditures

Brown and Doggett (1982) estimate that an additional 2.2 million jobs will be created by 1987 because of defense expenditures. Eckstein and Brown (1982) estimate that defense expenditures are likely to create an additional 1.17 million jobs within the defense industrial base through 1987. Substantial numbers of technicians, craftworkers, and other kinds of skilled workers will be required. Estimates of how defense spending will influence the employment vary according to the assumptions and methods used to generate the estimates, but defense spending will clearly create many additional jobs.

Two studies, one by Pothin (1982) and the other by Doggett (1983), provide regional forecasts of the demands for skilled workers that are likely to be created by defense expenditures. Pothin has identified seventy-one Standard Metropolitan Statistical Areas in twenty-nine states and Washington, D.C. that include 85 percent of all prime defense contractors. According to Doggett:

. . . 12 states supply nearly 60 percent of the goods and services required directly and indirectly to satisfy defense needs . . . [and] employment growth in 28 skilled categories, particularly defense-related employment growth, will be rapid enough to promote concern in 1 or more of 24 major metropolitan areas across the nation. (p. 2)

The DOD has compiled a list of fifteen skill fields "that must have an annual growth rate of over 3.8 percent if we are to meet our peacetime defense needs between now and 1987" (Carlucci 1983, p. 14). These occupations include shipfitters (with an estimated average annual growth rate of 16.4 percent!), aircraft mechanics, pattern and model makers, job and die setters, machinists, and tool and die makers.

A number of industry and association executives and other persons concerned with the availability of skilled workers within the defense and civilian production sectors of the economy have concluded that the supply of some kinds of skilled workers will not always be sufficient to meet the demands for them when and where they are needed. (Brown and Doggett 1982; Rosenthal 1982; Starr 1983; U.S. Congress 1981; U.S. House 1980).

Starr (1983) summarized four major reasons for assuming that shortages for some kinds of skilled workers will likely be with us in the future. First, the United States labor force is expected to increase anywhere from 17 to 25 percent between 1980 and 1990 (Pilot 1982, p. 46). At the same time, there has been a decline in the United States birthrate, which will result in fewer younger workers available to enter the work force (Flaim and Fullerton 1979).

Second, industry's need to become more profitable and competitive has caused—and may continue to influence—manufacturing firms to relocate. Other plants may shut down or reduce their skilled labor requirements because of unfavorable economic conditions. New employment opportunities for unemployed skilled workers may exist at some distance from where the workers reside, but many of them find it too difficult to relocate to new job sites. As a result, the number of skilled workers stays the same, but these workers are not necessarily available for employment where and when they are needed.

Third, there are likely to be shortages in certain skilled occupations if the trend away from manufacturing and toward service occupations continues. Fourth, a strong economic recovery accompanied by industrial expansion and modernization may create short-term imbalances in the supply and demand for skilled workers. It may also make it necessary to expand programs to train additional skilled workers and to upgrade the skills of existing workers.

Brown and Doggett (1982) studied the potential for labor shortages that are likely to be brought on by significant increases in national defense spending in the 1980s. They found that high levels of defense spending may create problems for the defense industrial base in finding enough skilled workers in a number of occupational categories. These categories include mechanical engineers, professional and technical workers, heavy equipment mechanics, tool and die makers, transport operatives, craftworkers, and construction craftworkers.

Rosenthal (1982) has studied whether or not there is a real shortage of machinists, an occupation that is critical to defense production. He found that "future supply-demand conditions for machinists are unclear" (p. 31). However he also found that:

... if defense purchases were to rise rapidly during a short time frame and affect industries in a specific area, the shortage (of skilled machinists) could become so acute that the planned increases in production could not occur. (p. 36)

Dale (1983) has reviewed studies dealing with the employment effects of the defense budget. He concludes:

It is a near certainty that there will be some production bottlenecks and spot shortages of skilled labor over the next several years, due in part to the defense buildup. It is not clear at this point precisely when and where these shortages will occur, or what should be done about them. (p. 159)

The DOD has been concerned with both the defense and civilian marketplaces need for adequate information to assess the economic and employment effects of defense expenditures. To meet this need, the DOD has developed with Data Resources Inc. the Defense Economic Impact Modeling System (DEIMS). DEIMS analyzes the economic impact of defense expenditures on the United States economy. It provides planning information on defense requirements to private sector firms, and it allows the DOD to analyze the impact of alternative defense budgets on key industrial sectors, skilled labor categories, and raw material requirements (Blond 1982). According to Blond:

DEIMS is a first step in our efforts to improve the planning process in American industry. The Department of Defense is taking the lead in this effort because we recognize that without an adequate, stable, and healthy industrial base, national security goals cannot be achieved. We hope that the information freely provided by the Department will serve as a guide to private firms interested in broadening their customer bases, and/or modernizing their capital plant and equipment. Forecasts are also being provided to the Department of Labor and to other educational and training organizations in order to encourage more new job entrants to consider learning skills and disciplines that are likely to be in the greatest demand in the future. (unpaged)

The Congress believes that more complete and detailed information about the employment effects of national defense expenditures is required in order to formulate legislation and national policies that can ensure the availability of an adequate pool of skilled labor if mobilization becomes necessary. An example of this congressional concern is found in the Conference Report for the Department of Defense Authorization Act of 1983. In this report, conferees directed the Secretaries of Defense and Labor to:

... conduct a study to determine the level of skilled labor needed and available in the civilian workforce to accomplish the programs planned by the Department of Defense for fiscal years 1983 through 1987 and needed and available during a mobilization period. (p. 183)

The Report of the Senate Committee on Armed Services dealing with the Omnibus Defense Authorization Act of 1984 indicates that:

On April 22, 1983, the Defense Department submitted a report to the House and Senate Armed Services Committees entitled Regional Forecasts of Industrial Base Manpower Demand, 1981 to 1987. This report combines detailed information on employment in 163 occupations in 82 industries ... thereby permitting estimation of future employment by occupation nationally, by state, and for each of 70 major cities. This analysis is based on a model called the Regional Occupational Planning and Evaluation System (ROPES). The ROPES model represents the first effort by the Defense Department to disaggregate the manpower impact of expenditures for defense procurement programs to the location of performance in order to assist manpower planning operations in identifying local trends in labor demand.

Although the fiscal year 1983 Defense Authorization Conference Report directs the Defense Department to study both the demand for and the supply of skilled labor in the civilian workforce needed to accomplish planned defense programs, the analysis presented by the Department represents only forecasts of labor demand. Labor supply considerations have not yet been addressed because, according to the Department, the state of the art in labor supply forecasting, particularly at the local level is inadequate to support detailed conclusions. (p. 210)

The Senate Committee has directed the Secretary of Defense in conjunction with the Secretary of Labor to submit a report to the House and Senate Armed Services Committees by no later than March 1, 1984, that summarizes ongoing efforts by the Departments in developing forecasts of supply by skill types and region of the country that can be used in conjunction with the labor demand forecasts of the ROPES model. The Senate Committee believes that if the supply and demand interface can be accomplished, then:

This effort will also provide invaluable planning guidance for vocational and training educators . . . to respond with programs to meet the increased demand for civilian skills needed to accomplish defense programs in the future. Finally, the results will assist the Congress in evaluating the need for legislation designed to alleviate potential skilled labor shortages in the civilian work force. (p. 210)

It is reasonable to assume that the number of skilled workers needed within the defense industrial base will increase as a result of increasing national defense expenditures. What is not yet known is whether the supply of skilled workers who possess the particular skills needed to meet defense contract requirements will be available, where and when needed. What is also not clear is the extent to which there is, or will be, a need to upgrade the skills of incumbent skilled workers within the defense industrial base. Nevertheless, there seems to be a widespread belief that the upgrading of substantial numbers of skilled industrial workers, and the retraining of others is, and will continue to be, a serious national concern.

Summary of Procedures and Contents of the Study

This report contains suggested strategies and procedures for use by state vocational education agencies to aid them to initiate or increase a response to the skill needs of firms doing defense work. These strategies and procedures were formulated after a series of activities that included:

- requesting all state vocational education agencies to forward off-the-shelf documents describing how these agencies provided for the skills training needs of the defense industrial base,
- reviewing pertinent literature about defense industrial base skill needs and vocational education's response to those needs,
- involving representatives from thirty-one state vocational education agencies, four industries, and two national vocational education groups as contributors and reactors to suggested strategies and procedures and study findings and recommendations.

A list of these persons and their organizational affiliations appear in appendix A.

The state vocational education representatives were selected or recommended by the state director of vocational education. The industry representatives were selected by project staff because of their involvement or expressed interest in promoting collaborative efforts between firms doing defense work and vocational education.

Project staff prepared an initial set of suggested strategies and procedures for enhancing the responsiveness of state vocational education agencies to the skill needs of firms doing defense work.

The initial set of suggestions were submitted to nine agency representatives. These persons were asked to: (1) confirm those suggestions they believed would be most valuable for enhancing responsiveness, (2) reject those suggestions they deemed to be impractical, and (3) offer additional suggestions for consideration and advice on how the initial set of suggestions should be modified.

Project staff used this external advice as a basis for preparing a revised list of suggestions. The revised list was submitted to a second group of nine industry and education representatives for their reactions and advice. This process was repeated and a final set of suggested strategies and procedures was produced. This final set of suggested strategies and procedures is found in chapter II.

Chapter III contains study findings about the responsiveness of state vocational education agencies to the skills training needs of the domestic defense industrial base. These findings served as a basis for recommendations to state and federal entities. The recommendations are designed to enhance the likelihood that state vocational education agencies will increase their present level of response to defense industrial base skills training needs.

A set of tentative findings and recommendations were put together by project staff. The advice of nine external study participants was used to finalize the findings and recommendations.

CHAPTER II

STRATEGIES AND PROCEDURES

This chapter presents a number of planning and implementing strategies and procedures that states may want to consider as they initiate or increase their training response to the skill needs of firms within the defense industrial base. Five strategies (see figure 1) are accompanied by thirty suggested procedures for their implementation. Several of the suggested procedures focus on increasing the professional skills of state staff who are or may become responsible for implementing, managing, or supporting vocational training programs for firms doing defense work. The list of strategies and procedures presented in this chapter should be considered as a resource of ideas, each of which may be accepted, rejected, or modified to fit the state agency's particular contexts and constraints.

The suggested strategies and procedures found in this chapter are directed principally to state vocational education agencies. However, many of the suggestions could be useful to local education agencies and institutions that are planning to initiate or increase a response to the skill training needs of firms doing defense work. Note that the final set of strategies and procedures presented in this chapter are a synthesis that included numerous suggestions and reactions of persons in the states. The procedures have not been formally tested and validated for usefulness. Also, strategies and procedures that are useful and practical for initiating and increasing a response to defense industrial base skill training needs in one state may be impractical in another state.

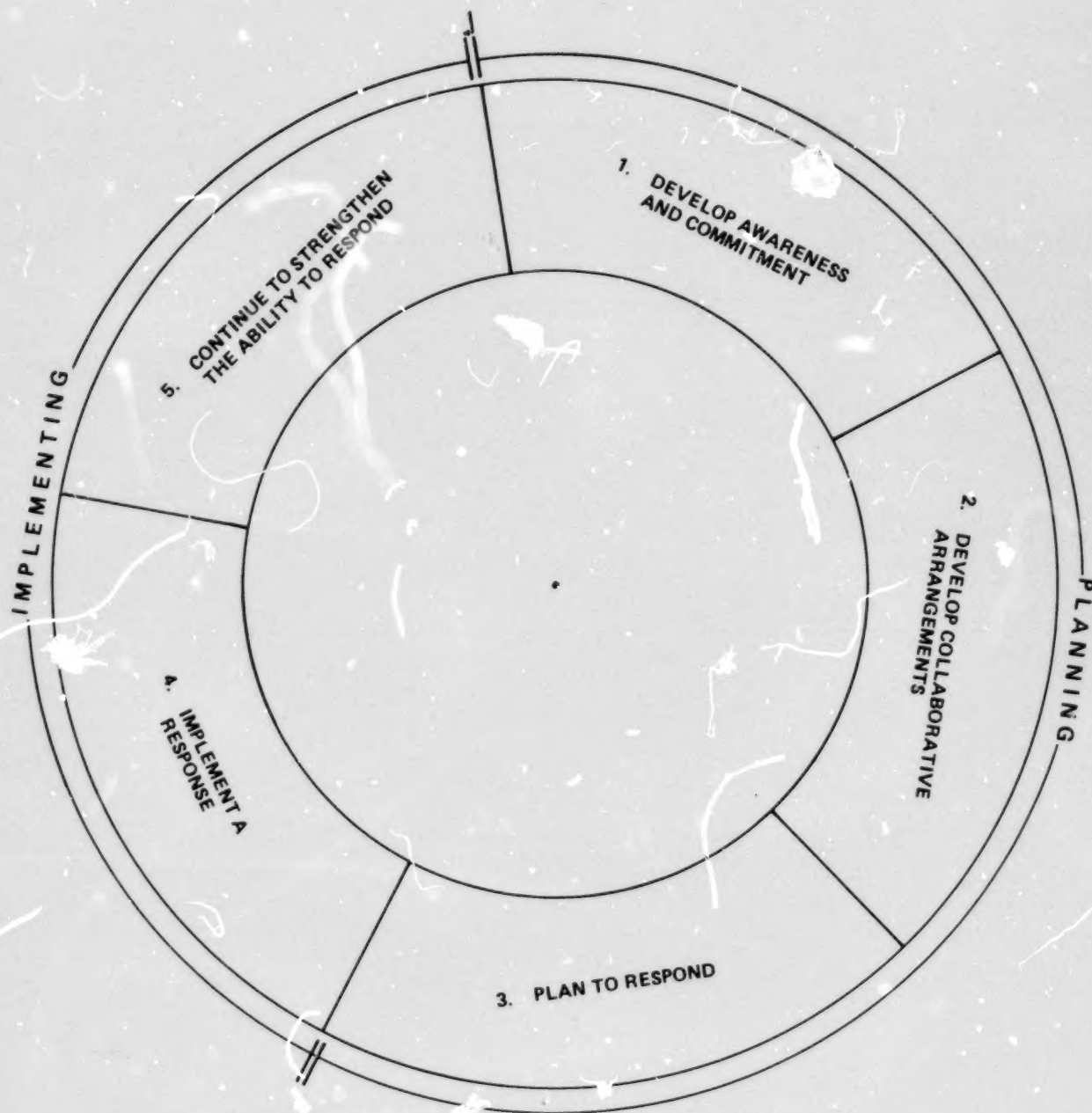


Figure 1. Strategies for Planning and Implementing a Training Response

Develop Awareness and Commitment

Procedures:

- Plan for multistate, statewide, and/or substate vocational education and defense industrial base conferences to be attended by vocational educators (e.g., local directors and deans of occupational education); industry trainers; chief executive officers and/or other management persons from industry; representatives of unions and industry associations (e.g., the National Security Industrial Association); state vocational education staff; and persons representing the governor's office, the state's economic development agency, and the state employment security agency. Use the conferences to explore such things as (1) evidence that skill shortages exist within the defense industrial base (or are likely to exist) that will affect the ability of firms to deliver on defense work commitments, (2) the kinds of preemployment and employee training that are desired by firms doing defense work, (3) how the vocational education delivery system works and what vocational education's capabilities are to respond to immediate and long-term skill needs, and (4) examples of ongoing and completed vocational education programs serving firms doing defense work and the kinds of training facilities and expertise that can be made available to such firms.

These conferences would serve as a first step in identifying the extent of any defense industrial base skills training problem within the state. In addition, it would serve to bring together those persons who can do something about the problem.

- As a follow-up to the conferences, plan and conduct meetings that target on policy, leadership, planning, and implementing actions that need to be addressed by each of the groups represented at the conferences.
- Conduct on-site visits for industry and education persons from around the state to customized vocational education training programs and to firms doing defense work in order to acquaint these persons with defense industry training needs and the kinds of services that vocational education can provide.
- Encourage state vocational education staff, local directors, and deans of occupational education to join professional training and development associations and to participate in meetings of these organizations. By so doing, these vocational educators can gain a better understanding of industry's skill needs, how industry responds to these needs, and industry's perceptions of vocational education. This information can be used as a basis for planning how vocational education can better assist both industry in general, and firms doing defense work.
- Arrange for a defense industrial base advisory committee to vocational education, to be comprised for industry trainers and managers from firms doing defense work. Charge the committee with responsibility for (1) ascertaining what kinds of unmet skill needs are likely to affect production adversely in firms doing defense work, (2) assessing how well vocational education is responding to the skill needs of this segment of the state's industrial base, and (3) suggesting how vocational education could be more responsive in addressing industry's skill needs.

The advice of potential clients in suggesting ways of improving vocational education programs has always been promoted by vocational education. Advisory groups are considered as essential to the attainment of quality programs and services and to program relevance in serving client needs. This suggested procedure is an extension of current practice by state and local education agencies and institutions. At the state level, membership on the state advisory council could be broadened to include representation from the state's defense industrial base; and the state vocational education agency could request the state advisory council to give a special focus to the three activities described in the suggested procedure. A separate advisory committee could also be appointed. In either event, the likely outcome would be a stronger vocational education and industry commitment to jointly deal with the skill's training needs of the state's defense industrial base.

Develop Needed Collaborative Arrangements

Procedures:

- Invite trainers and management personnel from firms doing defense work to serve on local and state vocational education advisory committees, including the state plan group, and encourage the governor to appoint such persons to the state advisory council for vocational education.
- Encourage vocational education management at the state level to take the leadership role in promoting collaborative efforts among state agencies in order to come up with a procedural plan for coordinating state-level efforts to serve the training needs of firms doing defense work.
- Develop and implement a plan designed to promote collaboration and coordination in the use of facilities and personnel, articulation of curricula, and the like among local-level secondary and postsecondary vocational education agencies and institutions seeking to serve firms doing defense work.

Previous National Center research has pointed out the value of planning for collaboration and coordination (Starr et al. 1980). The involvement of persons in the planning process may be as important, if not more so, than the resulting plan in getting the kinds of inter-agency collaboration and coordination needed for an effective response.

- Plan for periodic meetings with state vocational education staff from neighboring states in order to explore policy, planning, and programming concerns, approaches, and solutions as these apply to vocational education's role in meeting the skill needs of firms doing defense work. This procedure would have the effect of setting the stage for regionalizing a vocational education response to the skills training needs of firms doing defense work. This is especially important in regions where there are networks of interdependent defense contractors and subcontractors.
- Assign to a particular unit or individual the leadership responsibility for promoting, planning, and taking part in state-level interagency, state-local vocational education, and vocational education-defense industry collaborative arrangements. Make sufficient resources available to ensure an effective job.
- Organize, on a substate (regional) basis, an ad hoc committee composed of vocational educators and industry persons in order to come up with a working plan for firms and local vocational education agencies and institutions to collaborate in competing for defense work and to conduct the kinds of training needed to support defense work. Leadership for establishing and maintaining these ad hoc committees should come from state or local vocational education agencies and institutions.
- Establish working relationships with persons in the U.S. Department of Defense who have responsibility for knowing about defense contracting in the states, in order to learn which firms are being awarded contracts to produce what kinds of products.

Plan to Respond**Procedures:**

- Formulate short- and long-range statewide and substate (regional) goals, objectives, desired outcomes, and resource needs for dealing with the current and anticipated skill shortages and training needs of the state's industries, including those doing defense work. Do this in collaboration with other pertinent state agencies (e.g., economic development, employment security), firms, and local vocational education institutions and agencies. Use the state plan for vocational education as one vehicle for indicating statewide and regional goals and objectives for reducing identified skill shortages being experienced by firms doing defense work.
- Use the state plan for vocational education to indicate if and how the state agency intends to give a priority to regular ongoing instructional programs and to customized training programs that address defense industrial base skill needs when approving local program applications and funding programs.
- Use the state plan for vocational education as one vehicle to express the state board's commitment to an effective vocational education response to shortages of skilled industrial workers and to the needs for upgrading the skills of workers employed by firms doing defensework.
- Request the state board for vocational education to go on record as endorsing a vocational education response to the skill needs of firms doing defense work and to indicate its desire that adequate state funds be made available for planning and implementing such a response.
- Convene human resource specialists from the state's agencies for economic development and employment services and from the state's universities in order to determine the feasibility of developing a quantitative or judgmental approach to predicting specific kinds of skill needs within the state's defense industrial base. If an approach is feasible, promote and support its implementation.

Implement a response

Procedures:

- Provide technical assistance (e.g., curricula, in-service administrator or teacher training) to local vocational education agencies and institutions, as necessary and requested, to enable them to respond effectively to defense industrial base training needs.
- Provide technical assistance to small- and medium-size firms that would like to get defense work but do not have the know-how to bid effectively for such work. Such technical assistance could involve (1) notifying firms through a newsletter or other channels of government requests for proposals to engage in defense work, and (2) conducting workshops to familiarize firms with government contracting procedures and proposal writing techniques.

The suggested procedure, and especially the workshops component, goes beyond the usual services provided to industry by state vocational education agencies. It may well be that some state vocational education agencies will want to consider employing consultants to help run the workshops or to train state staff to do so. This suggestion involves vocational educators in a job creation activity that is likely to be followed by a training role for vocational education.

- Inform firms that the state vocational education agency can strengthen a proposal to do defense work with a capacity statement outlining the customized training services offered to industry by vocational education and at no cost to the federal government.
- Assist local vocational education agencies and institutions in developing individualized institutional capacity statements that could be used to convince industry people that vocational education institutions and agencies can deliver training services in a timely and cost-effective manner.
- Collaborate with local vocational education agencies and institutions on a region-by-region basis to determine the differing training needs of small firms doing defense work. At any particular point in time, it is likely that only a few employees of small firms doing defense work will need skills training. This can make it impractical to conduct a separate customized vocational education program for each such firm. If aggregate demands for training are sufficient, vocational education programs could be implemented to serve a number of firms simultaneously. Evening and weekend classes would be especially helpful to such firms. Small- and even medium-size firms often cannot either afford to release employees to attend training classes off their premises or to have training conducted on-site during the regular workday.
- Establish a "brokering" service* to put firms doing defense work and desiring vocational education services in contact with those local vocational education agencies and institutions capable and interested in providing such services.

*For information about a unique locally developed brokerage and the steps used to implement such a brokering service contact Dean Kathy Lusk at the Rancho Santiago Community College District, 17th at Bristol Street, Santa Ana, California, 92706, or the Technology Exchange Center, 13162 Newhope Street, Garden Grove, California, 92643.

- Consider the value of aggressively promoting customized training programs to firms doing defense work by publicizing (1) vocational education's willingness to compete with other vendors, and (2) vocational education's ability to do training in a cost-effective and timely manner. This suggestion is intended to convince industry skeptics that it is good to do business with vocational education agencies and institutions, especially for firms that need a quick response to meet training needs required by defense contracting.
- Conduct workshops for local administrators, instructors, and other local vocational education staff to train them in how best to sell their training services, negotiate with firms, prepare contracts, and assess the satisfaction of firms receiving vocational education services.
- Establish an information and dissemination capability within the state agency to identify new defense work coming into the state (assuming this information can be obtained from the U.S. Department of Defense, the state's economic development agency, or from some other state agency) and describe ongoing and completed vocational education efforts in support of such work. Disseminate this information to selected firms, industry associations, local vocational education agencies, institutions, and providers, and the media across the state.
- Develop an early warning system to identify skill needs by using a number of procedures, such as (1) organizing a panel of industry volunteers to survey their training and management peers in other firms periodically to find out what kinds of emerging occupations, changing production technologies, skill shortages, and training needs are likely to occur in their particular industry, and requesting the panel to draw some general conclusions about what vocational education might do to respond; and, (2) arrange to work directly with firms that expect to be, or have been, awarded a large, multiview defense contract in order to understand and anticipate what kinds of, and how many, skilled workers will be needed at what points in the life of these contracts.

**Continue to Strengthen Vocational
Education's Ability to Respond**

Procedures:

- Determine which local vocational education agencies and institutions can offer customized training to industries doing defense work. Identify which of these agencies and institutions will require financial and/or technical assistance in order to initiate or maintain a quality response. Plan, on the basis of such information, to provide the kinds of technical and financial assistance that will be needed from the state agency.
- Conduct workshops for state and local vocational education administrators and staff to develop their skills to implement and manage customized training programs for industrial clients, including those doing defense work. Such workshops should focus on conducting outreach (i.e., how to secure clients' business); entering into contracting; and using performance, management, and assessment techniques.

Industry people should serve as contributors, reactors, participants, and resource persons in order to generate awareness and commitment on their part to vocational education as a useful resource for dealing with industry skill problems. In addition, the participation of industry people should add a real-world dimension to the content of the workshops.

By implementing this suggested procedure, state and local vocational educators would be better prepared to conduct business arrangements with firms doing defense work. The ability to conduct training services in a businesslike manner is essential when dealing with private sector firms.

- Based on the outcomes of providing technical assistance and conducting the kinds of workshops just described, identify and describe major facility, instructional, resource, and attitudinal conditions within the state's vocational education system that are likely to facilitate or impede an adequate response by vocational education to the skill needs of firms doing defense work. Use this information to suggest additional steps that need to be taken to make the vocational education system more responsive.

CHAPTER III

FINDINGS AND RECOMMENDATIONS

The federal government is concerned with the ability of the domestic defense industrial base to meet national defense preparedness goals. It has been claimed that defense production is affected adversely (although to an unknown extent) by the fact that some skilled workers lack particular skills required for the production or defense of goods and by spot shortages of skilled workers being available when and where they are needed. There are several reasons for believing that this situation is likely to become more serious in the future than it is at present.

In the first place, a significant increase in defense spending for durable goods in the 1980s is expected to occur. Also, the nation will likely undergo an economic recovery during this period of time. These two factors may result in increased demands for goods by both the defense and civilian sectors of the economy. As industrial production is expanded, it will, in turn, create demands for additional skilled workers, a substantial number of whom would be required to support defense-related production. Lastly, modifications in production technologies will probably result from automation and other technological advances. This means that many skilled workers employed within various firms comprising the defense industrial base will need to upgrade their skills to accommodate to new production techniques and processes.

If national defense preparedness goals are to be met under these circumstances without impairing civilian sector production, firms and vocational education agencies and institutions will have to commit themselves to responding to the skill needs of the defense industrial base.

Findings about vocational education's responsiveness to defense industrial base skill needs are presented next.* The findings suggest a number of actions that might be taken by the federal and state governments to improve the responsiveness of state and local vocational education systems to defense industrial base skills training needs. Recommended actions are presented for consideration by the U.S. Congress, the Departments of Education and Defense, and state legislatures and governors. The recommended actions were developed by project staff in consultation with nine vocational educators who participated in the study. No independent test of their usefulness or that of alternative recommendations was carried out.

*The findings and recommendations are limited by incomplete data about the extent and ways in which vocational education systems presently respond to defense industrial base training needs. For example, since only a few state vocational education agencies have identified the firms in their states that do defense work, they do not know the extent to which firms receiving customized vocational training programs use the training to support defense work.

Findings

The responsiveness of state vocational education agencies to the immediate and future skill needs of the domestic defense industrial base can be summarized as follows:

- State vocational education agencies respond to industry's skill needs in two ways. They respond to immediate skill needs by promoting and supporting the delivery of customized training programs to specific firms. They respond to forecasts of future skill needs by promoting and influencing the kinds of institutionally based vocational education programs that contribute to the supply of skilled workers available to meet industry's future demands for such workers.

Only a few state vocational education agencies participating in the present study give a special priority to promoting or supporting either customized training programs or regular institutional programs *specifically* to meet the skill needs of firms doing defense work. Most state vocational education agencies participating in the study feel no sense of urgency that would otherwise impel them to respond more vigorously.

- There is an absence of employment information of the kind that is needed to convince key staff in state vocational education agencies that there is really an urgent need with regard to preparing or upgrading skilled workers for their state's defense industrial base. The availability of such employment information does not ensure a greater response from state vocational education agencies, but it is probably a necessary precondition.
- State vocational education agencies need to be able to identify the firms in their states that are doing defense work.* Only a few state vocational education agencies participating in this study have information about the size or diversity of their state's defense industrial base or have access to the names of the firms comprising the base. Key staff in most state vocational education agencies have no idea how to get such information.
- The Congress and the U.S. Departments of Defense and Education believe that the defense industrial base is ailing. This belief is partly based on employers' claims of both spot shortages of skilled workers and the presence of too many undertrained skilled workers within the base. The Congress and the Departments believe that the public vocational education systems and firms within the defense industrial base should be closely collaborating in order to ensure that needed skills training is available where and when it is needed. Unfortunately, such collaboration for skill training purposes is not yet in place on a large scale and the major reasons for this situation remain unclear.

Recommendations

The Congress, the U.S. Departments of Education and Defense, state legislatures, and governors can be instrumental in enhancing the likelihood that state vocational education agencies will initiate or expand their responsiveness to defense industrial base skill needs. The following recommendations are presented for consideration by these federal and state entities.

*A publication that may be used for identifying some of these firms is *500 Contractors Receiving the Largest Dollar Volume of Prime Contract Awards for RDT and E*. This publication and two companion publications, *Military Prime Contract Awards by State* and *Prime Contract Awards by Region and State*, are issued annually and are available from the Directorate for Information Operations and Reports (DIOR), The U.S. Department of Defense, The Pentagon, Washington, DC.

Congress should consider the following actions:

- Incorporate in legislation the federal concern that vocational education systems serve the skill needs of the nation's defense industrial base. Federal legislation can express this concern in several ways. For example, the concern could be incorporated within the statement of purposes for such legislation. Alternatively, the legislation could explicitly make provisions for states to use federal dollars to plan for, administer, and/or support vocational education to meet defense industrial base skill needs.*
- Pass a technical amendment to the Job Training Partnership Act of 1982 to the effect that, where appropriate, Private Industrial Councils (PICs) include a representative of local firms doing defense work.
- Continue to encourage the U.S. Departments of Labor and Defense to report on skill needs within the defense industrial base nationally, regionally, and by state.
- Suggest to the federal administration that the membership of the National Advisory Council on Vocational Education include someone who can represent the interests of the defense industrial base.

The U.S. Departments of Education and Defense should consider the following actions:

- Recommend to the states that a military procurement representative sit in as a member of a technical group to advise the state plan group.
- Let each state vocational education agency know which person(s) in the U.S. Departments of Defense and Education will serve as contacts to respond to inquiries from state vocational education agencies regarding firms doing defense work (e.g., who they are and where they are) and to identify persons who could be helpful in assisting these state agencies in organizing statewide vocational education efforts in response to defense industrial base skill needs.
- Create increased awareness among the vocational and industrial communities about the federal concern for the skill needs of the defense industrial base via such means as publishing and disseminating a newsletter that highlights skill needs within the base as well as exemplary vocational education and industry collaborative efforts to deal with those skill needs.

State legislatures should consider the following action:

- Provide sufficient funds to support local- and/or state-agency sponsored customized vocational education programs to meet the state's defense industrial base skills training needs.

*Funding for exemplary programs and setaside provisions are two kinds of federal mechanisms that can stimulate a state response to the federal concern. Setaside provisions were not viewed as desirable by some of the vocational educators participating in this study because of what they viewed as inflexibility in allocating vocational education monies in response to needs. However, this mechanism is more likely to produce a state response to the training needs.

Governors should consider the following action:

- Implement regional invitational meetings for state board and agency leaders and representatives from a cross-section of firms doing defense work to (1) create an arena for formal dialogues between vocational educators and industry persons, and (2) encourage the parties to develop a joint plan for implementing a vocational education response to defense industrial base skill training needs.

Local school boards and vocational education administrators should consider the following actions:

- Invite state vocational education agency administrators to meet with the administrators of local education agencies and postsecondary education institutions within the area and with chief executive officers of firms doing defense work in the area served by these districts and institutions to (1) examine the conditions, incentives, and benefits that are required for school-industry collaboration for training workers; and, (2) to get clarification about the level and kinds of support that are available from the state vocational education agency.
- Request technical assistance from the state vocational education agency to establish a local level brokering service that can match the training needs of firms doing defense work in the local labor market area with local education agencies and postsecondary institutions serving the labor market area.

APPENDIX A

LIST OF PERSONS PARTICIPATING

STATE-LEVEL VOCATIONAL EDUCATION PARTICIPANTS

Arch Alexander
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